APPENDIX A

Relevant Industry R&D Projects

A number of projects related to issues in the *Roadmap* are ongoing or have recently been completed. Many of these projects are collaborations between industry, the metalcasting technical societies, government agencies, academia, and other stakeholders. A partial listing of these projects is provided below.

Products and Markets

- *Casting Conversions*

Materials Technology

- *Development of Material Data Bases for HPNb and HPNb+ Microalloy Steels*
- *Thermophysical Properties for Modeling*
- *Anisotropic Porous Castings*
- *Approval of Cast Metals for the Energy Industries*
- *Bismuth-Selenium Modified Red Brass Phases I and II*
- *Die Casting Die Life Extension*
- *High Speed Milling and Pulsed ECM: New Machining Technologies to Increase Die Life*
- *Determination of Residual Stress and Softening Effects on the Life of Die Casting Dies*
- *Extending the Life of H-13 Die Casting Dies*
- *Shot Sleeve Failure Analysis*
- *Coatings for Improved Wear Resistance of Die Casting Dies*
- *Evaluation of Coatings for Die Surfaces*
- *Permanent Coatings for Die Casting Dies*

- *Wear of Foundry Tooling*
- *Impurity Limits in Aluminum Bronzes*
- *A Study of Alloy-Microstructure-Performance Interactions*
- *Technology Development for Iron Casting Production*
- *High Alloy Steel Welding Practices*
- *Late Stream Inoculation*

Manufacturing Technology

- *Rapid Prototyping Applied to Tooling*
- *Wear Analysis of Foundry Tooling Materials*
- *Development of Process Improvements and Inspection Methods for High Alloy Stainless Steel Castings (standards, material data bases)*
- *Casting Design Software Evaluation*
- *Assessment of Fast Shot Transition Point on Filling Patterns and Casting Quality for Pressure Die Casting*
- *Design and Process Parameters for Permanent Mold Casting*
- *Yield Improvement (Using Solidification Software)*
- *Benchmarking*
- *Die Casting Quality Improvement Through Enhanced Die Casting Flow Performance*
- *Preventing Die Soldering During Zinc Die Casting*
- *Die Casting: Slow Shot Profiles*
- *Castability of Aluminum Foundry Alloys*
- *Heat Transfer and Casting Distortion*
- *Characterization of and Procedures to Eliminate Macro-Inclusions During Foundry Processing*
- *Sensor Systems for Die Casting Cavities*

- *On-Line Quality Assessment of Aluminum*
- *Investigation into the Formation of Casting Penetration Defects*
- *Machining Reject Reduction*
- *Development of Process Improvements and Inspection Methods for High Alloy Stainless Steel Castings (testing techniques to replace radiography)*
- *Thin Wall Iron Castings for Light Weight Components*
- *Clean Metal*
- *Lost Foam Process Development: Phases III and IV*
- *Die Casting: Dimensional Reproducibility*
- *Die Casting: Skin Thickness in 390 Alloy Casting*
- *Dimensional Capabilities*
- *Sensing and Control Systems for Die Casting*
- *Improved Process Control (Controlling Pouring Temperature)*
- *Cupola Modeling and Neural Networks*
- *Energy Assessment Procedure Manual*
- *Intelligent Induction Hardening*
- *Reduction in Energy Costs Due to Process Yield Improvements (Innovative Riser Techniques)*
- *Energy Manual for Die Casters*
- *Lost Foam Process Development: Phase III and IV*
- *Permanent Mold for Copper Alloys*
- *Semi-Solid Metalcasting and Squeeze Casting*

Environmental Technology.

- *Ferrous Foundry Emission Quantification*
- *Ferrous Foundry Emission Quantification*